Water for the World

Constructing Mechanically Aerated Lagoons
Technical Note No. SAN. 2.C.7

A mechanically aerated lagoon is similar to a stabilization pond except that it is equipped with one or more electrically powered aerators that treat effluent by mixing it with air. Constructing a mechanically aerated lagoon requires the services or an engineer or construction foreman experienced with these systems. Construction involves assembling materials, tools, and labor; preparing the site; staking the lagoon, embankment, and pipe locations; excavating the lagoon; building embankments; laying pipes; lining the lagoon; finishing embankments; and installing aerators.

This technical note describes how to construct a mechanically aerated lagoon. Most of the steps are identical to those described in "Constructing Stabilization Ponds," SAN.2.C.5. Read the entire technical note before beginning construction.

Useful Definition

EFFLUENT - Settled sewage.

Materials Needed

Before construction can begin, the project designer must provide:

1) Location map, or master sewer map, similar to Figure 1.

2) Design drawings, similar to Figure 2 and 3.

3) Materials list, similar to Table 1 the sample.

4) Aerator Manufacturer's instruction and specification sheet.

You will also need the technical note "Constructing Stabilization Ponds," SAN.2.C.5.

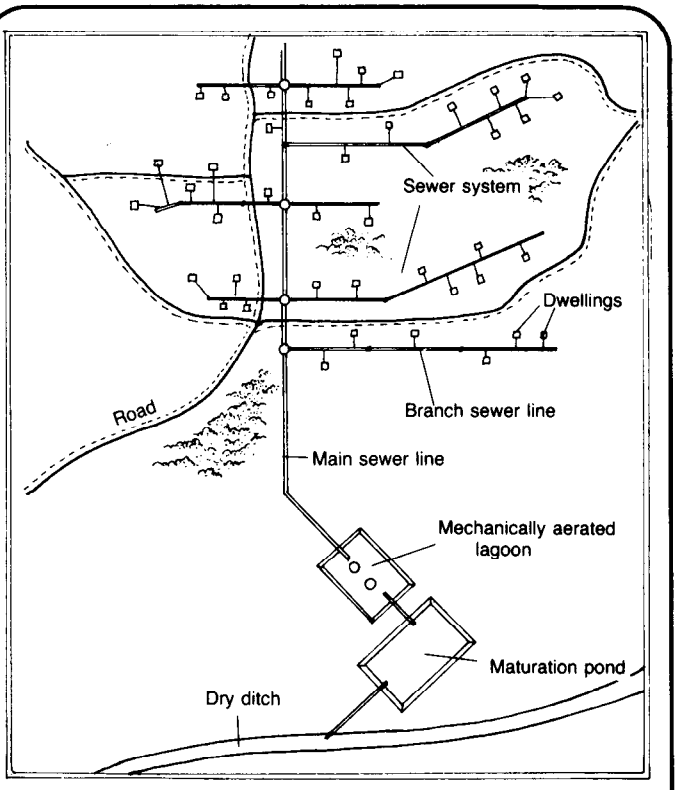

Figure 1. Location Map

Table 1. Sample Materials List for Aerated Lagoon

Item	Description	Quantity	Estimated Cost
Labor	Engineer experienced with aerated lagoons	1	____
	Electrician	1	____
	Worker skilled with concrete mortar	1	____
	Unskilled workers	6	____
	Backhoe operator	1	____
Supplies	Aerators, (including spare parts, electric cables, and mooring lines, etc.)	____	____
	Sewer pipe, 100mm diameter	____	____
	Valves, 100mm diameter	____	____
	Flat stones	____	____
	Mortar mix	____	____
	Grass seed	____	____
Tools	Backhoe	____	____
	Shovels	____	____
	Electrician's tools	____	____
	Mixing containers	____	____
	Trowels	____	____

Total Estimated Cost = ____

Construction Steps

Depending on local conditions, availability of materials, skills of workers, and so on, some construction

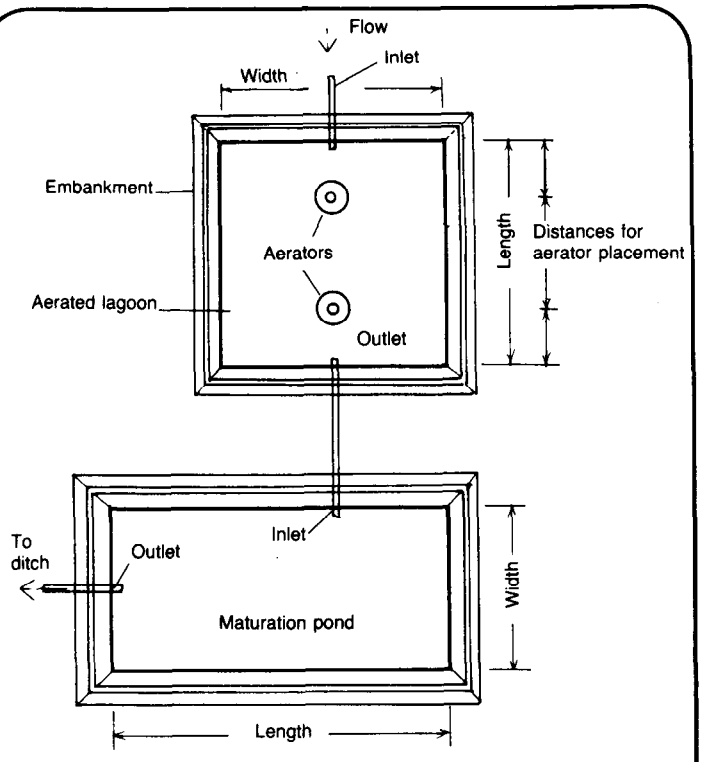

Figure 2. Design of Aerated Lagoon System

steps will take only a few hours, while others may require a day or more. Read the construciton steps and make a rough estimate of the time required for each step based on local conditions. You will then have an idea of when specific workmen, materials, and tools must be available during the construction process. Draw up a work schedule to Table 2, showing construction steps.

Preparing the Site

See "Constructing Stabilization Ponds," SAN.2.C.5.

Staking Lagoon, Embankment, and Pipe Locations

See "Constructing Stabilization Ponds," SAN.2.C.5.

Excavating the Lagoon

See "Constructing Stablization Ponds," SAN.2.C.5.

Building Embankments

See "Constructing Stabilization Ponds," SAN.2.C.5.

Laying Pipes

See "Constructing Stabilization Ponds," SAN.2.C.5.

Lining the Lagoon

The bottom of the lagoon and the inside of the embankment must be lined to prevent erosion caused by the aerators and to prevent bottom soil from being stirred into the effluent. See Figure 4.

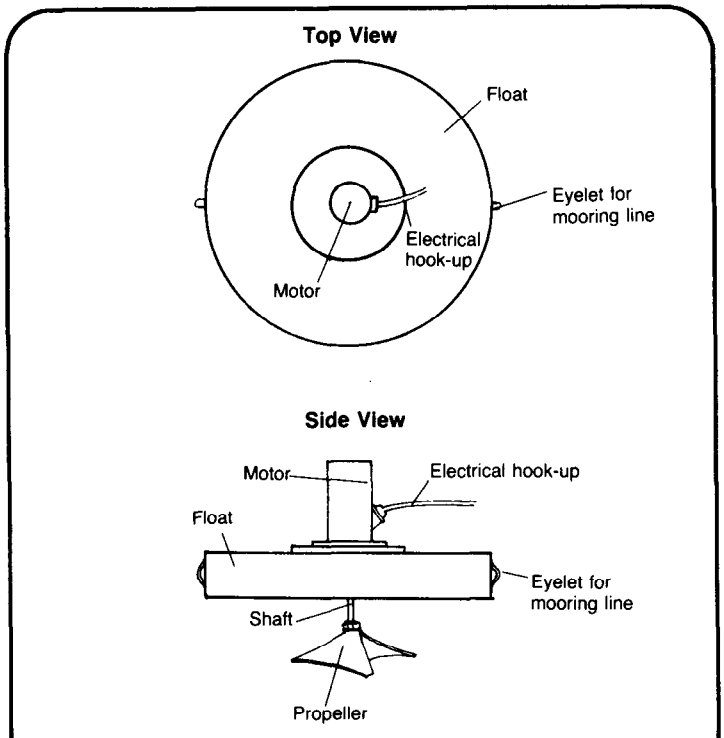

Figure 3. Aerator

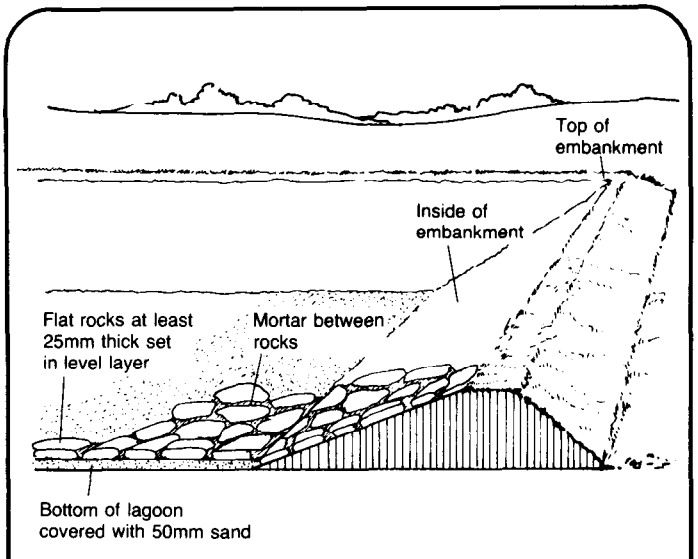

Figure 4. Lining the Lagoon

Table 2. Sample Work Schedule for Constructing an Aerated Lagoon.

Time Estimate	Day	Task	Personnel	Materials/Tools
½ day	1	Mark lagoon site	Engineer or experienced foreman (always present), 2 workers	Maps, drawings, measuring tape
1½ days	1-2	Clean site of trees, brush, and debris	6 workers	Axes, machetes, cart
1 day	3	Scrape topsoil and pile for finishing embankment	6 workers, 1 loader operator	Front-end loader, shovels
1 day	4	Stake site of lagoon, embankment, pipes	1 surveyor, 3 workers	Transit, level, level rod, steel measuring tape, stakes
4 days	5-8	Excavate lagoon and build embankments	1 loader operator, 6 workers	Front-end loader, shovels, picks, carts
1 day	9	Dig pipe trenches and lay pipe	6 workers, 1 worker skilled with mortar	Picks, shovels, 100mm diameter sewer pipe, pipe valves, mortar
4 days	10-13	Line the lagoon	6 workers, 1 worker skilled with mortar	Sand, flat stones, chipping hammers, safety goggles, mortar
2 days	14-15	Finish embankment	1 loader operator, 6 workers	Loader, shovels, topsoil, sod
½ day	16	Set securing posts	4 workers	Posts, shovels
1½ days	16-17	Lay electric cable	1 electrician, 4 workers	Electric cable, electricians tools, shovels

1. If the stones used for lining are not of uniform thickness, spread a 50mm layer of sand on the lagoon bottom. This will make it easier to work the stones into an even layer.

2. Stones used must be at least 25mm thick. Fit them as close together as possible. Use a stonemason's chipping hammer to improve the fit between the stones and wear protective goggles.

3. Pour concrete mortar between the stones and smooth with a trowel. The mortar should be 1 part cement, 2-3 parts sand, and enough water to make a very wet, pourable mix.

Finishing Embankment

See "Constructing Stabilization Ponds," SAN.2.C.5.

Installing Aerators

Floating aerators are connected to electric cables and held in place by mooring lines attached to securing posts on the embankment. See Figure 5.

1. String electric cable from the power source to the lagoon site. Cables should be suspended overhead or buried underground, and they should be

protected from damage caused by embankment maintenance.

2. Using the design drawings, locate the points for the securing posts on the embankment. The posts may be made of wood or steel and should be at least 1.0m long. Drive or set them firmly into the embankment.

3. The aerators cannot be positioned until the lagoon is filled to its design depth with effluent. See "Operating and Maintaining Mechanically Aerated Lagoons," SAN.2.0.7.

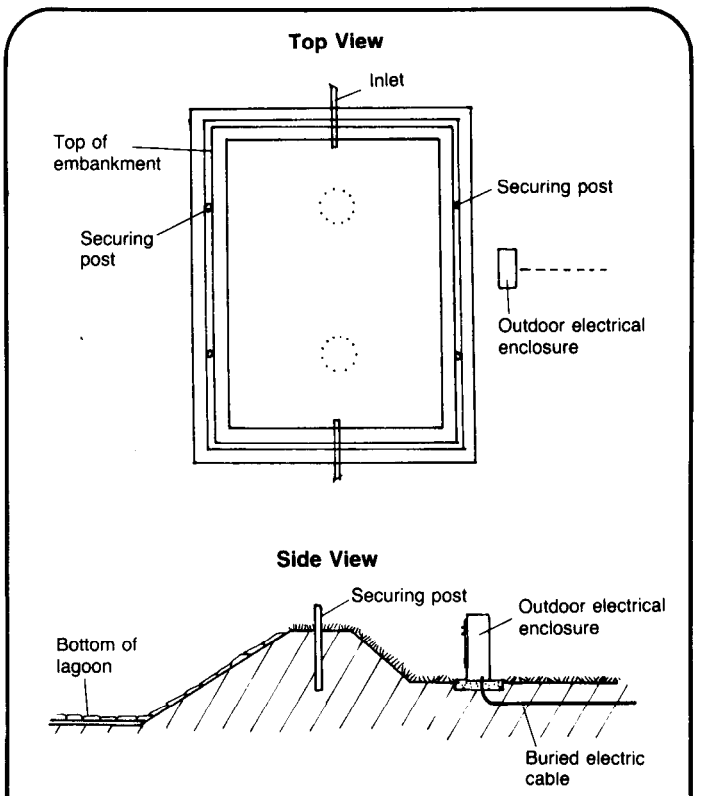

Figure 5. Positioning Securing Posts and Electric Cable

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